

CLAIMS

1. A delivery device actuatable to deliver substance, comprising:
a delivery outlet from which substance is in use delivered;
a gas chamber containing a gas and being of reducible volume, wherein a reduction in the volume of the gas chamber to a predeterminable volume acts to pressurize the contained gas to a predeterminable pressure;
a seal element disposed between the gas chamber and the delivery outlet; and
an opening mechanism configured, on reduction of the volume of the gas chamber to a predeterminable volume, to open the seal element, whereupon a gas flow from the gas chamber acts to deliver substance from the delivery outlet.
2. The delivery device of claim 1, wherein the gas chamber is defined in part by a flexible member to which an actuating force is in use applied in actuating the delivery device, with the actuating force acting to depress the flexible member such as to reduce the volume of the gas chamber and pressurize the gas contained therein.
3. The delivery device of claim 2, wherein the flexible member comprises an outwardly-projecting member which is depressed on application of an actuating force.
4. The delivery device of claim 3, wherein the flexible member comprises a dome-shaped member.
5. The delivery device of claim 3 or 4, wherein the flexible member is configured such as to provide for deflection thereof in a controlled, predeterminable fashion in depressing the same on application of an actuating force.

6. The delivery device of claim 5, wherein the flexible member is one or both of shaped or sized to provide for controlled deflection.
7. The delivery device of claim 6, wherein the flexible member includes ribs which provide for controlled deflection.
8. The delivery device of any of claims 2 to 7, wherein the seal element comprises a rupturable element, and the opening mechanism includes a rupturing element which acts to rupture the rupturable element on depression of the flexible member to a predetermined extent.
9. The delivery device of claim 8, wherein the rupturing element is supported at an inner surface of the flexible member in opposed relation to the rupturable element such as to be moved in a direction of an actuating force as applied to the flexible member.
10. The delivery device of claim 8, wherein the opening mechanism comprises an actuating arm which supports the rupturing element, with the actuating arm being movably disposed relative to the rupturable element on engagement by the flexible member, such that, on depression of the flexible member to a predetermined extent, the actuating arm is moved such as to cause the rupturing element to rupture the rupturable element.
11. The delivery device of claim 10, wherein the actuating arm is hingeably supported such that the rupturing element is rotated to rupture the rupturable element.
12. The delivery device of claim 8, wherein the opening mechanism comprises a link assembly which supports the rupturing element, with the link assembly being movable relative to the rupturable element on engagement by the flexible member, such that, on depression of the flexible member to a predetermined extent, the link assembly is

moved such as to cause the rupturing element to rupture the rupturable element.

13. The delivery device of claim 12, wherein the link assembly comprises first, second and third hinged links, with the first link being hinged relative to the rupturable element, the second link supporting the rupturing element at one, forward end thereof and the third link coupling the respective other ends of the first and second links, whereby depression of the flexible member acts to hinge the first link relative to the rupturable element, which movement, through the coupling provided by the third link, acts to drive the second link forwardly to cause the rupturing element supported thereby to rupture the rupturable element.
14. The delivery device of any of claims 2 to 7, wherein the seal element comprises a valve element, and the opening mechanism is configured to release the valve element on depression of the flexible member to a predetermined extent.
15. The delivery device of claim 14, further comprising:
a gas supply passage operatively in fluid communication with the delivery outlet; and
wherein the valve element is normally in a closed position in sealing engagement with the gas supply passage, and moved to an open position out of sealing engagement with the gas supply passage by the opening mechanism on depression of the flexible member to a predetermined extent.
16. The delivery device of claim 15, wherein the opening mechanism comprises a link assembly which supports the valve element, with the link assembly being movable relative to the gas supply passage on engagement by the flexible member, such that, on depression of the flexible member to a predetermined extent, the link assembly is

moved such as to cause the valve element to be moved to the open position.

17. The delivery device of claim 16, wherein the link assembly comprises first, second and third hinged links, with the first link being hinged relative to the gas supply passage, the second link supporting the valve element at one, forward end thereof and the third link coupling the respective other ends of the first and second links, whereby depression of the flexible member acts to hinge the first link relative to the gas supply passage, which movement, through the coupling provided by the third link, acts to drive the second link to cause the valve element supported thereby to be moved to the open position.
18. The delivery device of claim 17, wherein the link assembly is configured such that the valve element is withdrawn from the gas supply passage on depression of the flexible member to a predetermined extent.
19. The delivery device of claim 16, wherein the link assembly comprises first and second hinged links, with the first link being hinged relative to the gas supply passage and the second link supporting the valve element at one, forward end thereof, whereby depression of the flexible member acts to hinge the first link relative to the gas supply passage, which movement acts to drive the second link to cause the valve element supported thereby to be moved to the open position.
20. The delivery device of claim 19, wherein the valve element is pushed from the gas supply passage on depression of the flexible member to a predetermined extent.
21. The delivery device of claim 19 or 20, wherein the link assembly further comprises a supporting arm which acts normally to support

the link assembly such that the valve element is in the closed position.

22. The delivery device of claim 15, wherein the opening mechanism comprises an actuating arm which supports the valve element, with the actuating arm being movably disposed relative to the gas supply passage on engagement by the flexible member, such that, on depression of the flexible member to a predetermined extent, the actuating arm is moved such as to move the valve element to the open position.
23. The delivery device of claim 22, wherein the actuating arm is hingeably supported such that the valve element is rotated from the closed position.
24. The delivery device of claim 23, wherein the valve element comprises a flap.
25. The delivery device of any of claims 22 to 24, wherein the valve element is normally biased to the gas supply passage in the closed position.
26. The delivery device of any of claims 22 to 24, wherein the valve element is bonded to the gas supply passage in the closed position.
27. The delivery device of any of claims 1 to 26, further comprising:
at least one substance chamber for containing substance operatively in fluid communication with the delivery outlet.
28. The delivery device of claim 27, comprising:
first and second substance chambers, each separately containing substance components which are combined for delivery.

29. The delivery device of any of claims 1 to 28, wherein the delivery device is for insertion into a body cavity;
and further comprising:
an expansion mechanism for expanding the body cavity.
30. The delivery device of claim 29, wherein the expansion mechanism provides for sealing engagement with the body cavity.
31. The delivery device of claim 29 or 30, wherein the expansion mechanism comprises first and second expansion arms disposed in opposed relationship to respective sides of the delivery outlet, and an actuation member which in use is actuated by a subject in actuating the delivery device and effects expansion of the expansion arms.
32. The delivery device of claim 31, wherein the actuation member comprises an actuation body and first and second biasing arms extending forwardly of the actuation body such as to engage respective ones of the first and second expansion arms, whereby actuation of the actuation body acts to cause expansion of the first and second expansion arms.
33. The delivery device of claim 32, wherein the first and second biasing arms comprise resilient elements which act to bias respective ones of the first and second biasing arms outwardly.
34. The delivery device of claim 29 or 30, wherein the expansion mechanism comprises first and second levers which are pivotally hinged relative to opposed sides of the delivery outlet, each of the levers comprising a first, expansion arm extending forwardly and laterally of the delivery outlet and a second, biasing arm extending rearwardly, whereby, on application of an actuation force to the biasing arms such as to bias the same inwardly, the expansion arms are driven outwardly to effect expansion of the same.

35. The delivery device of claim 34, wherein the actuation member comprises an actuation body and first and second links which couple respective ones of the biasing arms to the actuation body.
36. The delivery device of claim 29 or 30, wherein the expansion mechanism comprises a lever which is hinged relative to delivery outlet, the lever comprising a loading arm which is acted upon by a subject in actuating the delivery device, and an expansion arm extending forwardly to one side of the delivery outlet, whereby the expansion arm is moved outwardly relative to the delivery outlet on a subject acting upon the loading arm.
37. The delivery device of any of claims 1 to 36, wherein the delivery device is a nasal delivery device.
38. The delivery device of any of claims 1 to 36, wherein the delivery device is an oral delivery device.
39. The delivery device of any of claims 1 to 38, wherein substance is delivered as a liquid.
40. The delivery device of any of claims 1 to 38, wherein substance is delivered as a powder.
41. A delivery device, comprising:
 - a gas-filled chamber of variable volume;
 - a delivery outlet coupled to the chamber and from which substance is deliverable, carried by the gas from the chamber;
 - a seal between the chamber and the delivery outlet; and
 - opening means for opening the seal on reduction of the volume of the chamber to a predeterminable volume, to allow the gas pressurized

by the reduction in the volume of the chamber to flow through the delivery outlet.

42. A method of delivering substance, comprising the steps of:
reducing the volume of a gas-filled chamber to pressurize the gas contained therein;
when the volume of the chamber is reduced to a predeterminable volume, providing a fluid connection between the chamber and a delivery outlet such as cause the pressurized gas to deliver substance from the delivery outlet.
43. A delivery device substantially as hereinbefore described with reference to any of Figures 1 to 3, Figures 4 and 5, Figures 6 and 7, Figures 8 to 10, Figures 11 and 12, Figures 13 and 14, Figures 15 and 16, Figures 17 and 18 or Figures 19 and 20, optionally in conjunction with any of Figures 21 and 22, Figures 23 and 24 or Figures 24 and 25, of the accompanying drawings.
44. A delivery method substantially as hereinbefore described with reference to any of Figures 1 to 3, Figures 4 and 5, Figures 6 and 7, Figures 8 to 10, Figures 11 and 12, Figures 13 and 14, Figures 15 and 16, Figures 17 and 18 or Figures 19 and 20, optionally in conjunction with any of Figures 21 and 22, Figures 23 and 24 or Figures 24 and 25, of the accompanying drawings.